

ANIMAL LIFE.<sup>1</sup>

WITH the appearance of this half-volume we have to congratulate the author and his publishers on the completion of a work which must have involved an enormous amount of labour, and which, in this country at any rate, is unique. The great impulse which has of late years been given to "nature-teaching" rendered a work of this class almost essential (for the mode of treatment could not have been adopted in a systematic natural history), and Prof. Davis has realised the want, and done his best to supply what was required.

In spite of certain errors and blemishes, to some of which we have directed attention on previous occasions, and bearing in mind the magnitude of

right errors. For instance, the statement on p. 313 that Lake Baikal was recently connected with the sea is totally opposed to modern views; and it is equally untrue that the great Indian rhinoceros "bites," (p. 373), while the statement (p. 421) that there are no wild oxen in Africa at least requires qualification. On p. 469 we find the usual exaggerated statement of the size of dinosaurs (115 instead of 60 or 70 feet!). Among misspelt names it must suffice to mention (p. 430) *Padus* for *Pudua*, and (p. 432) *Euneces* for *Eunectes* (we can guess whence the author copied the latter); but it may be added that *Saccomyidæ* is not the proper title for the pocket-gophers, or *Euspongia* for the typical sponges. An expression on p. 375 leads one to believe that the author is unaware of the existence

of the Devon and Somerset staghounds; while (p. 379) the term "hunting," as applied to fishes, seems somewhat misplaced.

The section on geographical distribution may perhaps be best described as feeble, the author "wobbling" on the subject of "Wallace's line," and being apparently unacquainted either with the works of Max Weber or with a certain text-book published by the Cambridge University Press. In fairness to his readers the author should have told them that there are distributional divisions of the globe other than those adopted by Dr. Wallace; and also that such divisions are based on the range of mammals and birds, and do not accord with that of several other groups.

The coloured plates render this and its

fellow volumes attractive to the general reader, and most of the other illustrations (one of which is here reproduced) are well chosen and well executed.

R. L.

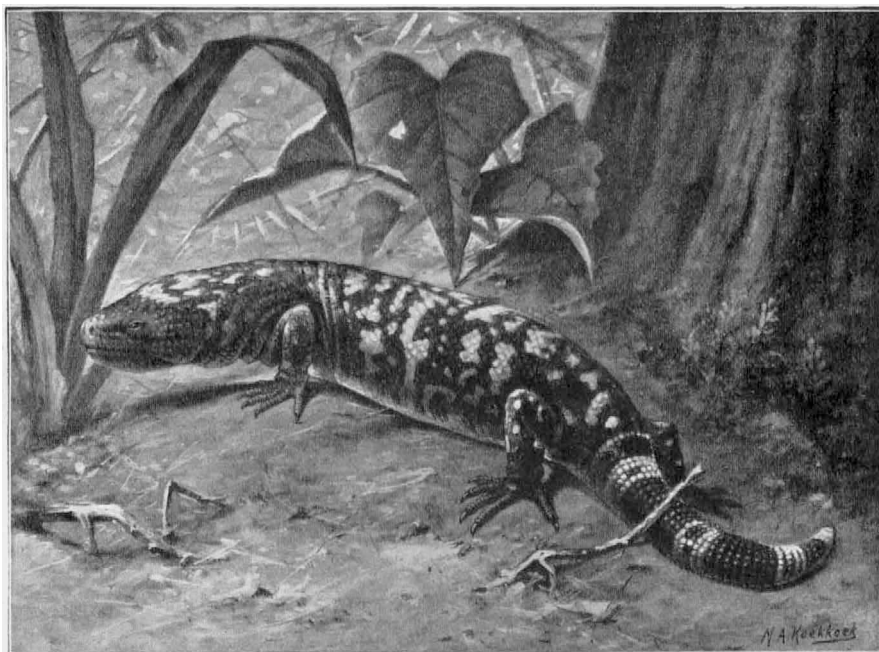


FIG. 1.—Mexican Poisonous Lizard (*Heloderma horridum*). From "The Natural History of Animals."

the task for a single individual, it may be safely said that, on the whole, the author has been successful in his efforts, and that when a second edition is called for and the necessary emendations and corrections have been made the work will take its place as an important popular text-book of bionomics.

The half-volume now before us includes some of the most interesting sections of the whole subject, discussing as it does the economic aspect of zoology, the natural history of sport, animals as pets, geographical distribution, the palæontological record, and the doctrine of evolution and heredity. Unfortunately, the author has not allowed sufficient space for some of these subjects. Fur-bearing animals are, for instance, very imperfectly described, no mention being made of such important furs as Arctic and silver fox, otter and nutria; and if only the author had left out the "old wives' tales" about the shrew on pp. 319 and 320 he would have had ample room for proper treatment.

Neither is the volume altogether free from down-

<sup>1</sup> "The Natural History of Animals; the Animal Life of the World in its various Aspects and Relations." By J. R. A. Davis. Half vol. viii. Pp. xviii+261-555. (London: The Gresham Publishing Co., 1904.) Price 7s. net.

#### THE CONDITION OF CHEMICAL INDUSTRIES IN FRANCE.

THE results of an inquiry into the present condition of French chemical industries are described in the *Revue scientifique* of January 28. The upshot of this inquiry is the recommendation that a society should be founded for France, having its headquarters in Paris, with branches in all large towns in France, with a council consisting of the heads of industrial enterprises, the professors in universities and "lycées," of independent persons, and of all interested in industrial chemistry. The duties of this society should be (1) to suggest and press on the Government solutions of the great economic problems of importance to chemical industry; (2) to collect statistics abroad and to endeavour to gain markets for French products by aid of the consular service; and to devise means to prevent competition between French

manufacturers, and to promote combination among them against their foreign rivals; and (3) to act as an advisory body to industrial chemists, and to take steps to direct the education of young chemists into channels helpful to the progress of chemical industry. It is suggested that the work of the society should be aided by congresses in certain towns, which should be attended by the local manufacturers, as well as by those who carry on the same or similar processes elsewhere. In conclusion, the future president, it is suggested, should be Prof. Haller, who has done so much for the industrial progress of the town and University of Nancy, and who is now professor at the Sorbonne, the University of Paris.

Such are the recommendations of the report. The reasons annexed to these recommendations, which form the earlier part of the report, are derived from numerous letters from and interviews with members of some eighty-two representative firms. The opinions of some of these form amusing reading. Thus we learn from the manufacturers of "eau de Javel," the precursor of bleaching-powder, that Monsieur B., "suffit à l'exploitation." In another case "The brewery has no chemist at all, and gets all its analyses made at the brewing-school." Another firm which produces "some rare bodies" (one would like to know what they are) dismisses the question in almost the historical words which preceded the decapitation of Lavoisier—"Aucun besoin de la collaboration des savants"! Another intelligent manufacturer, designated as X, (1) ventures the daring statement that "the candle industry and chemistry have nothing in common." Oh, shade of Dumas! X (10) does not think that the collaboration of "savants" would be useful in the extraction of dyeing stuffs from wood; and a soap-maker, X (16), who confesses himself ignorant of chemistry, thinks that "chemistry can contribute nothing of use to the soap industry, seeing that soap is always made in the same way"!

These examples show that some educative action is necessary in France. The necessity is also apparent when recent statistics are considered. For while the raw materials exported from Germany have remained practically stationary for the last twenty years, those imported have doubled in value; and while the imports of manufactured products have barely increased in value during the same interval of time, the value of the exported manufactured chemical substances has risen from 200 million marks in 1880 to 352 million marks in 1900. The progress in France, accordingly, is much behind that of Germany. To add insult to injury, the red trousers, so conspicuous in the French Army, were designed originally to encourage the cultivation of the madder plant; the plant is commercially as extinct as the dodo, and the trousers are now dyed with artificial alizarin supplied from Germany! *Sacre nom de tonnerre!*

As this article is written in the hope of reaching the ignorant, the author, M. Jean Jaubert, has taken some pains to show how many-sided the industrial chemist should be if he is to direct his enterprise intelligently, and he sketches the steps taken by the Germans to secure such general knowledge. The collaboration of manufactories and university professors, the give and take, the university training of the scientific heads of departments in chemical works, account for an increase between 1887 and 1900 in the number of works in Germany from 4235 to 7169; in the number of workmen from 82,000 to 153,000; and for an increase in the average wage of these workmen from 38*l.* to 50*l.* a year; and the average percentage dividend of 121 joint-stock companies, obliged by law to publish their accounts, has risen from 9¼ per cent. in 1888 to 13½ per cent.

in 1899. Evidently German chemical industry is prosperous, and profitable to all classes concerned. Indeed, the dividend of artificial colouring companies shows a still better figure; the increase in dividend is from 15 per cent. in 1888 to 20½ per cent. in 1900.

Unfortunately, similar statistics are not furnished for France, either because they do not exist or because they are better concealed.

How can this distressing state of affairs be remedied? To what is industrial France to turn? The opinions of many manufacturers are quoted, and some shall be adduced here. First, secondary education is at fault; all initiative is crushed in the secondary schools, and all pupils are turned out of one uniform mould. But, it is acknowledged, an attempt is being made to remedy this. Second, it is said nearly unanimously, by all those asked for their opinions, that the training of young chemists is not sufficiently practical. There is in the universities too much tendency to train teachers rather than industrial men; and the professors often look down on the commercial side of their science. The union of science and industry is recommended. Like ourselves, the French manufacturers, ignorant themselves, often engage a young chemist, and expect him at once to know all about their work and to be able to devise improvements; when they find out that he is of little value they condemn chemistry, as we have seen in what precedes. Others complain that they have to pay their chemists for a year or a year and a half while he is learning their needs; and yet it is acknowledged that no education in a technical school can be of any value; for the teacher cannot teach anything worth knowing about the really important dodges employed by the manufacturer, nor is he welcomed in the work if he lectures on any special process. In a minority of works the German system is followed; young men are engaged as juniors, and work under the supervision of seniors; according to the ability and tastes which they show for routine work, for management, or for invention, they are kept as analysts, made managers, or left in the research laboratory. But it is justly remarked that this excellent plan is impossible for small manufacturers.

In many (most?) cases the difficulty lies in the smallness of the remuneration. It appears common for a chemist to receive 48*l.* to 72*l.* a year, rare for the pay to exceed 100*l.* Now that is little more than workmen's wages; and it is the reward of an expensive education. Yet the manufacturer often grumbles at having to teach such young men their business, and says that they should pay for his tuition; and on the other hand, the chemist who has survived the kicks, cuffs and insults from the foreman, and hard work of the first year, and has acquired some practical knowledge, does not see why he should not better himself if he can.

Again, German firms employ chemists in many walks of life. A man who is a chemist makes a much better traveller for a chemical firm than an ignoramus who can only tout his goods; and their chemists, if they show commercial ability, often take to the business side of the concern, and they know chemistry is a recommendation, not a drawback.

In spite of the low pay, France, according to all reports, is overcrowded with chemists. Some pity them; others think that this plethora will lead to the survival of the fittest. The old-fashioned foreman is as undying in France as here, however, and as opposed to any attempt at innovation. Yet he is being displaced by chemists in some works; and this, common in Germany, is one of the chief causes of her industrial prosperity. The foreman, knowing some tips of importance, looks askance at anyone



who attacks experimentally the problems of his manufactures; for he knows if they are once discovered his use is past. On the other hand, if foreman work is done by a chemist, trained in experimental methods and anxious to improve his product (and his position), reforms can be made, and are willingly undertaken. We in England are in a similar plight; one of the greatest preventives to progress is the foreman. Why, many chemists would be glad of his 3*l.* a week, and would be infinitely more useful.

A closer intimacy between professor and manufacturer is strongly urged. But in France there is apparently mutual distrust. The standing of the professors is low, for one thing, the best paid post (at Paris) bringing in only 800*l.* a year; in the provinces the salaries run from 240*l.* to 400*l.* This contrasts unpleasantly with German salaries, which seldom fall below 600*l.*, and may amount to 3600*l.* In France, many men have a taste for the career of professor, and will work cheap for glory; "that is the French character." Most French professors, according to one of them (rashly named in this article), do nothing and care nothing for industry. In short, collaboration between manufacturer and chemist is wanting owing to jealousy of the latter towards colleagues who meddle with industrial problems, to ignorance and shyness of both parties, and to the want of any intermediary who can bring them into contact.

Besides the recommendations stated in the outset, it is advised that special schools be created, *e.g.* for perfumes, for colours, for soaps, where young chemists shall receive special training.

Now what can we in England learn from this exhaustive discussion? We have many of the same defects; we suffer from the supremacy of the foreman; from the want of interest in industry of the professors (although this is lessening); from the want of intelligence and scientific training of many manufacturers; and from the lack of special schools. In the old days of the Le Blanc soda process the works served as schools for young chemists; now things are too specialised. In prosperous times, the manufacturer does not see the need of a chemist; when bad times come, the luxury of a chemist cannot be afforded. What we want, what the Germans have got, and what the Americans are rapidly getting, is a race of scientifically trained manufacturers; combinations of those engaged in the same industry, so that common laboratories of research may be kept running; the replacement of rule-of-thumb foremen by chemically trained submanagers of a better class, who have had something in the nature of a scientific education, and who are imbued with the spirit of research, leading them to keep their eyes open to every possible improvement; this they would gain first in actual educational establishments, under the guidance of capable professors, and later in the special laboratories mentioned above; and lastly, thorough cooperation between teachers and manufacturers, so that problems capable of being solved in a university laboratory, and of scientific interest, should be transferred there, with the prospect of an ultimate reward should they prove commercially useful; and a liberal attitude of mind on the part of manufacturers, so that they would take a little trouble to become acquainted with the progress of scientific chemistry, with the view of its utilisation for money-making purposes, and a readiness to consider any problems suggested in the university laboratory, with the view of their being worked out industrially. We are moving slowly towards attaining this ideal. Is it any comfort that France appears on her own showing to be more backward? Until the people con-

cerned learn to view such problems from a scientific standpoint, little more can be done. The only thing is for those who can to preach, and above all to practise.

W. R.

### NOTES.

THE new session of Parliament was opened on Tuesday by the King, who was accompanied by the Queen, with the customary ceremonial. The King's speech to the House of Commons announced that provisions for amending the laws relating to education in Scotland will again be brought forward, and that a proposal for establishing a Minister of Commerce and Industry will be introduced.

At the annual meeting of the Royal Astronomical Society on Friday last, the gold medal of the society, awarded by the council to Prof. Boss, director of the Dudley Observatory, Albany, New York State, was received by Mr. Choate, the United States Ambassador, for transmission to Prof. Boss. The president afterwards handed to the secretary the Jackson-Gwilt bronze medal for transmission to Mr. Tebbutt, who for many years has carried on astronomical research in his observatory in New South Wales.

At a meeting of the trustees of the Percy Sladen fund, held at the Linnean Society, Burlington House, on February 3, grants varying in amount were made to Mr. W. R. Ogilvie Grant, toward the expenses of a collector for the British Museum in Central Africa; to Miss Alice L. Embleton, to enable her to continue her investigations in insect cytology; and to Mr. J. Stanley Gardiner, toward the expenses of an expedition to the Indian Ocean.

M. RADAU has been appointed president, Vice-Admiral Fournier vice-president, and M. Bigourdan secretary of the Bureau des Longitudes, Paris.

M. F. J. P. FOLIE, honorary director of the Royal Observatory at Brussels, died at Liège on January 29 in his seventy-second year.

WE regret to see the announcement of the death of Mr. Robert Tucker, who was for thirty-five years (November, 1867–November, 1902) honorary secretary of the London Mathematical Society.

REUTER states that the Argentine sloop of war *Uruguay*, last reported at Punta Arenas, has returned to Buenos Ayres after her voyage in the Antarctic seas, having failed to obtain any news of the French Antarctic Expedition under Dr. Charcot.

IT is proposed to establish an International Association of Anatomists at a meeting to be held at Geneva on August 7–10. The initiative has been taken by the anatomists of the Swiss universities and has the support of the anatomical societies of Germany, Great Britain, France, Italy, and America.

THE *Athenaeum* announces the death, on January 29, of Prof. H. Landois, professor of zoology and director of the Zoological Garden at Munster, in his seventieth year. Prof. Landois was the author of "Der Mensch und das Tierreich," "Das Pflanzenreich," "Das Mineralreich," and other works.

CAPTAIN JOHN DONNELL SMITH, of Baltimore, has given, says *Science*, to the Smithsonian Institution his private herbarium consisting of more than 100,000 mounted sheets and his botanical library of nearly 1600 bound volumes. Captain Smith's collection is probably the largest private herbarium in America, being very rich in tropical plants.